Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte JOHN L. SULLIVAN, JOHN MATTHEW GINDER and KIRSTEN MARIE CARR

Appeal No. 2003-0749
Application No. 09/332,070

ON BRIEF

Before FRANKFORT, STAAB and BAHR, Administrative Patent Judges.

BAHR, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-4, 6-9 and 11-20. Claims 5, 10 and 21 were canceled subsequent to the final rejection (see Paper Nos. 20 and 22). No other claims are pending in this application.

We REVERSE.

BACKGROUND

The appellants' invention relates to a programmable seat belt damper assembly for a motor vehicle (specification, page 1). Specifically, the seat belt damper assembly utilizes magneto-rheological fluid whose apparent viscosity is increased upon the application of a magnetic field thereto by an electromagnet to increase the damping rate or torque generated by the rotary damper such that the damper assembly permits limited highly damped torso travel to reduce occupant kinetic energy (specification, page 3). A copy of the claims under appeal is set forth in the appendix to the appellants' brief.

The examiner relied upon the following prior art references in rejecting the appealed claims:

Blake et al. (Blake)	4,815,674	Mar. 28, 1989
Carlson et al. (Carlson)	5,277,281	Jan. 11, 1994
Bauer et al. (Bauer)	5,873,599	Feb. 23, 1999
Karlow	6,019,392	Feb. 1, 2000 (filed Nov. 18, 1998)

The following rejections are before us on appeal.

Claims 1-4, 6-9, 11 and 13-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Blake in view of Carlson and Karlow.

Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Blake in view of Carlson, Karlow and Bauer.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the answer (Paper No. 24) for the examiner's complete reasoning in support of the rejections and to the brief and reply brief (Paper Nos. 23 and 25) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. For the reasons which follow, we cannot sustain the examiner's rejections.

Blake, the primary reference relied upon by the examiner in rejecting the claims, discloses a seat belt retractor with an electro-rheological lock. The locking mechanism comprises an electro-rheological fluid 62 contained within a cavity 42 of a housing member 40. An electrode 48 is situated in the cavity. An electrical circuit including an inertia sensor switch is provided to subject the electro-rheological fluid to a high voltage. When the inertia sensor senses vehicle deceleration of a predetermined magnitude, a high voltage control unit is energized to subject the electrode 48 and housing 40 to a high voltage differential. Blake (column 2, lines 46-62) discloses that

> [t]he electro-rheological fluid 62 is exposed to this electric field and causes the water to be expelled from the particles and act as an adhesive agent making the particles congeal together. As a result, the electro-rheological fluid 62

> becomes a solid and fixes the electrode 48 against rotation relative to the housing so that the reel shaft 26 and reel 24 are in turn locked against belt winding and unwinding rotation.
>
> When the inertia condition ceases, the voltage is removed, and the electro-rheological fluid 62 returns from the solid condition to the fluid condition permitting normal winding and unwinding rotation.
>
> It will be understood that the programming unit 66 may be constructed to vary the voltage applied to the electro-rheological fluid 62 so that the locking force applied to the electrode is varied to obtain a desired locking characteristic of the retractor.

Blake differs from the invention recited in independent claims 1, 13 and 20 in two ways. First, Blake's locking device uses electro-rheological fluid rather than magneto-rheological fluid as called for in appellants' claims. Second, Blake's electrical controller sends a signal to generate an electric field which turns the electro-rheological fluid to a <u>solid</u> and <u>locks</u> the reel shaft and reel against winding and unwinding rotation; it thus does not increase the apparent viscosity of the fluid to a viscosity which permits some unwinding of the seat belt, as called for in appellants' claims.

The examiner does not acknowledge this second difference. On this point, the examiner (answer, pages 5-6) states that

> [i]t is inherent that for any given situation, a voltage between zero and the high voltage would produce a state in which the ER fluid effects damping of the reel. Furthermore, on the way to the high voltage and the solid state, the voltage has gone through some intermediate voltages where the fluid has higher viscosity and therefore has effected damping. A high voltage for effecting a solid state for a seated occupant

> weighing 120 pounds is different than one for an occupant weighing 300 pounds.
>
> By “to vary the voltage applied ...so that the locking force applied to the electrode is varied to obtain a desired locking characteristic of the retractor” (Blake et al, column 2, lines 58-62), it is deemed that such inherently includes the instance where a voltage value less than the “high voltage differential” which produces the fully locked state is applied resulting in some rotation of the disk and reel and therefore some unwinding of the seatbelt (i.e. a state between the freely-rotating state and the fully locked state). There does not seem to be any benefit or reason to apply a voltage higher than the “high voltage differential” which produces the fully locked state.
>
> Furthermore, since the seated occupant can be of any of a variety of sizes and weights, it is deemed that a much-heavier-than-normal occupant will produce an inertia force higher than the locking force in Blake et al resulting in some unwinding of the seatbelt.

The examiner’s statement that, on the way to the high voltage and to the solid state, the voltage has gone through some intermediate voltages where the fluid has a viscosity which provides damping, is speculative at best without further details as to how the voltage is generated by Blake’s high voltage generating unit and transmitted to the electrode. Further, it is not apparent to us why the high voltage for effecting a solid state of the electro-rheological fluid would differ depending on the weight of the seated occupant. The required voltage would appear to be determined by the properties of the fluid itself. Finally, while Blake discloses that the locking force may be varied by varying the applied voltage, Blake gives absolutely no indication that a locking force lower than that required to lock the reel shaft and reel against rotation for any seated occupant is contemplated.

Carlson discusses the advantages of using magneto-rheological fluid dampers as compared with electro-rheological fluid dampers in column 1. Karlow discloses a variable level seatbelt energy management device comprising a magneto-rheological fluid resistance mechanism (a piston and cylinder arrangement) and a permanent magnet having a first magnetic field oriented so as to increase the viscosity of the fluid and an electromagnet which generates a second magnetic field to cancel the first magnetic field to decrease the fluid's viscosity, thereby also reducing the resistance to seatbelt webbing payout. The controller for controlling the supply of power to the electromagnet controls the resistance of the cylinder to motion, such that the cylinder can be controlled to withstand motion, present no resistance to motion or supply a resistance somewhere in between. In fact, because of the magneto-rheological fluid's quick response time to external magnetic fields, the resistance of the cylinder can be varied at different time intervals during a collision so that a traveler could be "braked" in a controlled manner during a collision where energy is dissipated by the cylinder in the manner most protective of the traveler. See column 3, lines 8-28. Karlow also points out that an advantage of providing a permanent magnet to increase the viscosity and an electromagnet to cancel the permanent magnet's field and decrease the viscosity is that, if the electrical system fails, the permanent magnet will maintain the magneto-rheological fluid's high viscosity to provide a fail-safe method for affixing a seatbelt mechanism (column 3, lines 36-50).

Even assuming that it would have been obvious to use magneto-rheological fluid in place of the electro-rheological fluid in Blake's apparatus to take advantage of the qualities of magneto-rheological fluid, as determined by the examiner on page 5 of the answer, none of the references teaches or suggests a controller electrically connected to the damper for <u>increasing</u> the viscosity of the fluid based on predetermined factors, wherein the <u>increased</u> viscosity permits some unwinding of the seat belt during an impact, as called for in claim 1.

For the foregoing reasons, we cannot sustain the examiner's rejection of independent claims 1, 13 and 20, or, it follows, of dependent claims 2-4, 6-9, 11 and 14-19, as being unpatentable over Blake in view of Carlson and Karlow.

Bauer discloses an apparatus for pretensioning seat belt webbing using a pair of pyrotechnic charges. Based on inputs from occupant weight sensors, occupant height sensors and occupant position sensors, a controller determines whether to actuate only one or both of the pyrotechnic charges. If only one of the pyrotechnic charges is actuated, one level of resistance to seat belt unwinding is provided; if both charges are actuated, a higher level of resistance is provided. The objective of Bauer's system is to remove any slack in the seat belt webbing rather than to pull the occupant against the seat back (column 5, lines 63-65).

Bauer also fails to teach or suggest a controller for increasing the viscosity of the magneto-rheological fluid of a seat belt damper wherein the increased viscosity permits some unwinding of the seat belt and thus provides no cure for the deficiency of the combination of Blake, Carlson and Karlow discussed above. It thus follows that we also cannot sustain the rejection of claim 12 as being unpatentable over Blake in view of Carlson, Karlow and Bauer.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1-4, 6-9 and 11-20 under 35 U.S.C. § 103(a) is reversed.

REVERSED

CHARLES E. FRANKFORT Administrative Patent Judge	)
	) BOARD OF PATENT
LAWRENCE J. STAAB Administrative Patent Judge	) APPEALS) AND) INTERFERENCES
JENNIFER D. BAHR Administrative Patent Judge	)

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